

PTO/SB/08A (10-01)

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**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

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Sheet **1** of **5****Complete if Known**

Application Number	09/875,458
Filing Date	06/05/2001
First Named Inventor	CULVER, Craig F.
Art Unit	2674
Examiner Name	WU, Xiao Min
Attorney Docket Number	IMM059A (51851-280615)

RECEIVED
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Technology Center 2600**U.S. PATENT DOCUMENTS**

Examiner	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
<i>Xiao Wu</i>		3,220,121	11/30/1965	Cutler	
		3,517,446	6/30/1970	Corlyon et al.	
		3,623,064	11/23/1970	Kagan	
		3,903,614	9/9/1975	Diamond et al.	
		3,911,416	10/7/1995	Feder	
		4,236,325	10/2/1980	Hall et al.	
		4,513,235	4/23/1985	Acklam et al.	
		4,599,070	7/8/1986	Hladky et al.	
		4,708,656	11/24/1987	De Vries et al.	
		4,713,007	12/15/1987	Alban	
		4,794,392	12/27/1988	Selinko	
		4,891,764	1/2/1990	McIntosh	
		5,019,761	5/28/1991	Kraft	
		5,022,407	6/11/1991	Horch et al.	
		5,240,417	8/31/1993	Smithson et al.	
		5,271,290	12/21/1993	Fischer	
		5,275,174	1/4/1994	Cook	
		5,785,630	7/28/1998	Bobick et al.	
		3,157,853	11/17/1964	Hirsch	
		3,497,668	2/24/1970	Hirsch	
		3,902,687	6/25/1973	Hightower	
		4,160,508	7/10/1979	Salsbury	
		4,581,491	4/8/1986	Boothroyd	
		4,930,770	6/5/1990	Baker	
		4,934,694	6/19/1990	McIntosh	
		5,035,242	7/30/1991	Franklin	
		5,038,089	8/6/1991	Szakaly	
		5,078,152	1/7/1992	Bond	
		5,299,810	4/5/1994	Pierce	
		5,309,140	5/3/1994	Everett	
		5,334,027	8/2/1994	Wherlock	
		5,547,382	8/20/1996	Yamasaki	
		5,212,473	5/18/1993	Louis	
		5,466,213	11/14/1995	Hogan	
		5,766,016	6/16/1998	Sinclair	
		5,186,695	2/16/1993	Mangseth et al.	
Examiner Signature	<i>Xiao Wu</i>		Date Considered	<i>7-27-03</i>	

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**INFORMATION DISCLOSURE
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Sheet **2** of **5****Complete if Known**

Application Number	09/875,458
Filing Date	06/05/2001
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Attorney Docket Number	IMM059A (51851-280615)

U.S. PATENT DOCUMENTS

Examiner	Cite No. ¹	Document Number Number Kind Code ² (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
<i>Xm</i>		2,972,140	2/14/1961	Hirsch	
		5,437,607	8/1/1995	Taylor	
		6,422,941	7/23/2002	Thomer et al.	
		4,464,117	8/7/1984	Forest	
		5,022,384	6/11/1991	Freels	
		5,575,761	11/19/1996	Hajianpour	
		6,160,489	12/12/2000	Perry et al.	
		5,175,459	12/29/1992	Danial et al.	
		5,283,970	2/8/1994	Aigner	
		4,262,549	4/21/1981	Schwellenbach	
		4,333,070	6/1/1982	Barnes	
		5,165,897	11/24/1992	Johnson	
		4,484,191	11/20/1984	Vavra	
		5,438,622	7/25/1995	Gutman et al.	
<i>Xm</i>		6,111,577	8/29/2000	Zilles et al.	

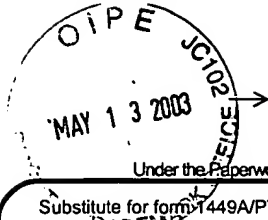
Examiner Initials*	Cite No. ¹	Foreign Patent Document			Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Country Code ³	Number ⁴	Kind Code ⁵ (if known)			
	BW	EP	EP0349086		1/3/1990	Visser	

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Considered*7-27-03*

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet **3** of **5**

Complete if Known

Application Number	09/875,458
Filing Date	06/05/2001
First Named Inventor	CULVER, Craig F.
Art Unit	2674
Examiner Name	WU, Xiao Min
Attorney Docket Number	IMM059A (51851-280615)

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OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
<i>kn</i>		BAIGRIE, "Electric Control Loading - A Low Cost, High Performance Alternative," Proceedings, pp. 247-254, November 6-8, 1990.
		IWATA, "Pen-based Haptic Virtual Environment, 0-7803-1363-1/93 IEEE, pp 287-292, 1993.
		RUSO, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," MIT Libraries Archives 08/14/1990, pp. 1-131, May 1990.
		BROOKS et al., "Hand Controllers for Teleoperation - A State-of-the-Art Technology Survey and Evaluation," JPL Publication 85-11; NASA-CR-175890; N85-28559, pp. 1-84, 03/1/1985.
		JONES et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); Experimental Brain Research, Vol. 79, No. 1, pp. 150-156, 1990.
		BURDEA et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," 1993 IEEE International conference on Robotics and Automation, pp. 25-44, 05/02/1993.
		SNOW et al., "Model-X Force-Reflecting-Hand-Controller," NT Control No. MPO-17851; JPL Case No. 5348, pp. 1-4, 06/15/1989.
		OUH-YOUNG, "Force Display in Molecular Docking," Order No. 9034744, p. 1-369, 1990.
		TADROS, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators, MIT Archive © Massachusetts Institute of Technology, pp. 1-88, February 1990.
		CALDWELL et al., "Enhanced Tactile Feedback (Tele-Taction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993.
		ADELSTEIN, "Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, Advances in Robotics, Edited by H. Kazerooni, pp. 1-12, 1992.
		GOTOW et al., "Controlled Impedance Test Apparatus for Studying Human Interpretation of Kinesthetic Feedback," WA11-11:00, pp. 332-337
<i>✓</i>		STANLEY et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, Advances in Robotics, pp. 55-61, ASME 1992.
<i>kn</i>		RUSO, "Controlling Dissipative Magnetic Particle Brakes In Force Reflective Devices," DSC-Vol. 42, Advances In Robotics, pp. 63-70, ASME 1992.

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Signature

XIAO WU

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**INFORMATION DISCLOSURE
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Sheet **4** of **5****Complete if Known**

Application Number	09/875,458
Filing Date	06/05/2001
First Named Inventor	CULVER, Craig F.
Art Unit	2674
Examiner Name	WU, Xiao Min
Attorney Docket Number	IMM059A (51851-280615)

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Technology Center 2800**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

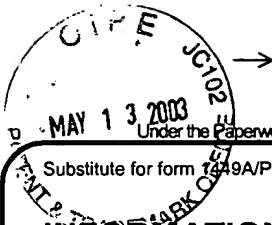
Examiner Initials *	Cite No. ¹	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
<i>Ku</i>		KONTARINIS et al., "Display of High-Frequency Tactile Information to Teleoperators," Telemanipulator Technology and Space Telerobotics, Won S. Klm, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993.
		PATRICK et al., "Design and Testing of A Non-reactive, Fingertip, Tactile Display for Interaction with Remote Environments," Cooperative Intelligent Robotics in Space, Rui J. deFigueiredo et al., Editor, Proc. SPIE Vol. 1387, pp. 215-222, 1990.
		ADELSTEIN, "A Virtual Environment System For The Study of Human Arm Tremor," Ph.D. Dissertation, Dept. of Mechanical Engineering, MIT, June 1989.
		BEJCZY, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," Science, Vol. 208, No. 4450, pp. 1327-1335, 1980.
		BEJCZY, "Generalization of Bilateral Force-Reflecting Control of Manipulators," Proceedings Of Fourth CISM-IFTOMM, Sep. 8-12, 1981.
		MCAFFEE, "Teleoperator Subsystem/Telerobot Demonstrator: Force Reflecting Hand Controller Equipment Manual," JPL D-5172, pp. 1-50, A1-A36, B1-B5, C1-C36, January 1988.
		MINSKY, "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedback Display," Ph.D. Dissertation, MIT, June 1995.
		JOCOBSEN et al., "High Performance, Dexterous Telerobotic Manipulator With Force Reflection," Intervention/ROV '91 Conference & Exposition, Hollywood, Florida, May 21-23, 1991.
		SHIMOGA, "Finger Force and Touch Feedback Issues In Dexterous Telemanipulation," Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration, Rensselaer Polytechnic Institute, Sep. 30 - Oct. 1, 1992.
		IBM Technical Disclosure Bulletin, "Mouse Ball-Actuating Device With Force and Tactile Feedback," Vol. 32, No. 9B, February 1990
		TERRY et al., "Tactile Feedback In A Computer Mouse," Proceedings of fourteenth Annual Northeast Bioengineering Conference, University of New Hampshire, March 10-11, 1988.
		HOWE, "A Force-Reflecting Teleoperated Hand System for the Study of Tactile Sensing In Precision Manipulation," Proceedings of the 1992 IEEE International Conference on Robotics and Automation, Nice, France, May 1992.
		EBERHARDT et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," IEEE Virtual Reality Annual International Symposium, Seattle, WA, Sep. 18-22, 1993.
<i>Ku</i>		RABINOWITZ et al., "Multidimensional tactile displays: Identification of vibratory intensity, frequency, and contactor area," Journal of The Acoustical Society of America, Vol. 82, No. 4, October 1987.

Examiner
Signature*XIAO WU*Date
Considered*7-27-03*

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet **5** of **5**

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Application Number	09/875,458
Filing Date	06/05/2001
First Named Inventor	CULVER, Craig F.
Art Unit	2674
Examiner Name	WU, Xiao Min
Attorney Docket Number	IMM059A (51851-280615)

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OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

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Xu		BEJCZY et al., "Kinesthetic Coupling Between Operator and Remote Manipulator," International Computer Technology Conference, The American Society of Mechanical Engineers, San Francisco, CA, August 12-15, 1980.
		BEJCZY et al., "A Laboratory Breadboard System For Dual-Arm Teleoperation," SOAR '89 Workshop, JSC, Houston, TX, July 25-27, 1989.
		OUH-YOUNG, "A Low-Cost Force Feedback Joystick and Its Use in PC Video Games," IEEE Transactions on Consumer Electronics, Vol. 41, No. 3, August 1995.
		MARCUS, "Touch Feedback in Surgery," Proceedings of Virtual Reality and Medicine The Cutting Edge, Sep. 8-11, 1994.
		BEJCZY, et al., "Universal Computer Control System (UCCS) For Space Telerobots," CH2413-3/87/0000/0318501.00 1987 IEEE, 1987.
		PATRICK, "Design, Construction, and Testing of a Fingertip Tactile Display for Interaction with Virtual and Remote Environments," Master of Science Thesis, MIT, Nov. 8, 1990.
		CADLER, "Design of A Force-Feedback Touch-Introducing Actuator For Teleoperator Robot Control," Bachelor of Science Thesis, MIT, June 23, 1983.
		WIKER, "Teletouch Display Development: Phase 1 Report," Technical Report 1230, Naval Ocean Systems Center, San Diego, April 17, 1989.
		BLISS, "Optical-to-Tactile Image Conversion for the Blind," IEEE Transactions on Man-Machine Systems, Vol. MMS-11, No. 1, March 1970.
		JOHNSON, "Shape-Memory Alloy Tactile Feedback Actuator," Armstrong Aerospace Medical Research Laboratory, AAMRL-TR-90-039, August, 1990.
		KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," PRESENCE, 4(4):387-402, 1995.
✓		KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," PRESENCE, Vol. 4, No. 4, pp. 387-402, 1995.
Xu		LAKE, "Cyberman from Logitech," GameBytes, 1994.

Examiner
Signature

XIAO WU

Date
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